FLEXE

From Local to Extreme Environments

Engaging students in earth systems inquiry through GLOBE

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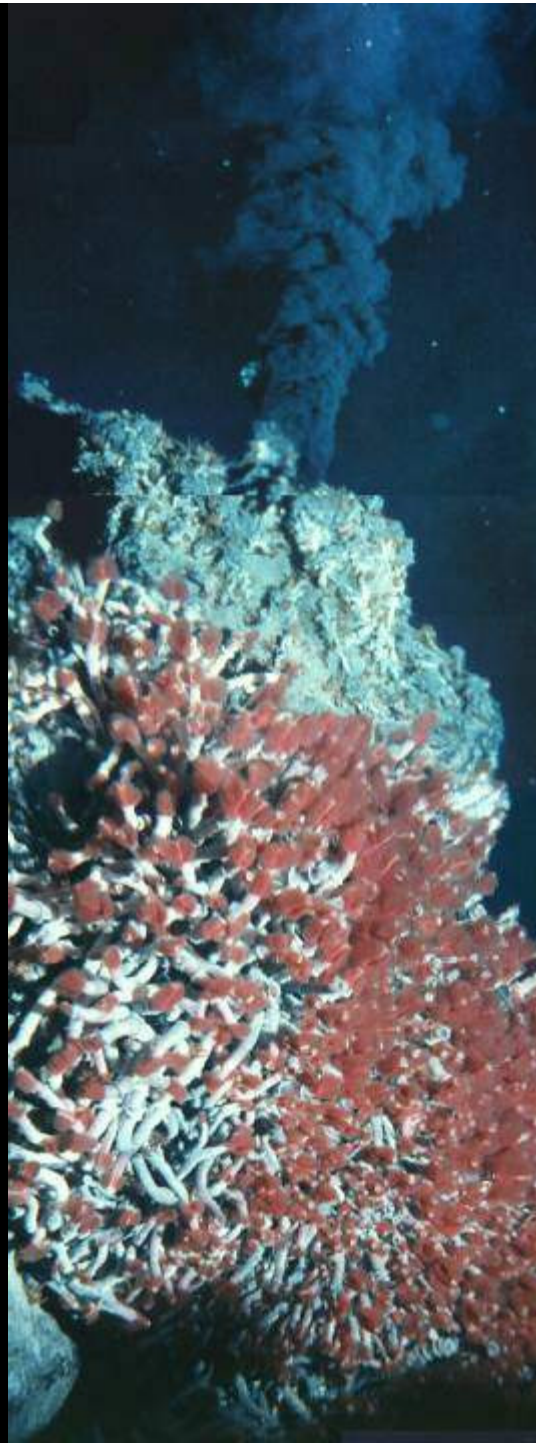
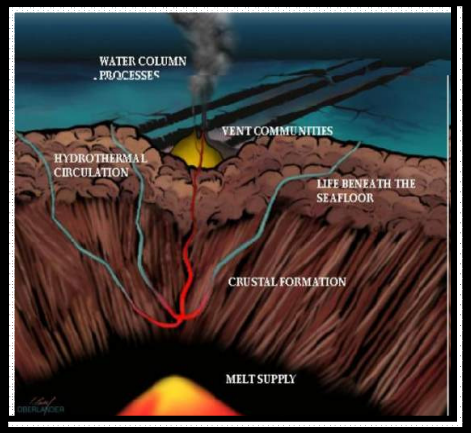


Agenda

- FLEXE Overview
  - Project goals, components, evaluation
- FLEXE initial pilot - Mar to May 2007
  - Thanks to those who participated!
- 2007-2008 plans
  - Energy Unit Pilot - Sep-Dec 2007
  - FLEXE Event - December
- How to get involved?

FLEXE Team: Science & Education

International deep-sea science partners



NSF Ridge2000

InterRidge

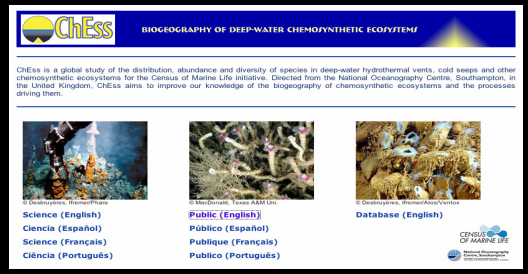
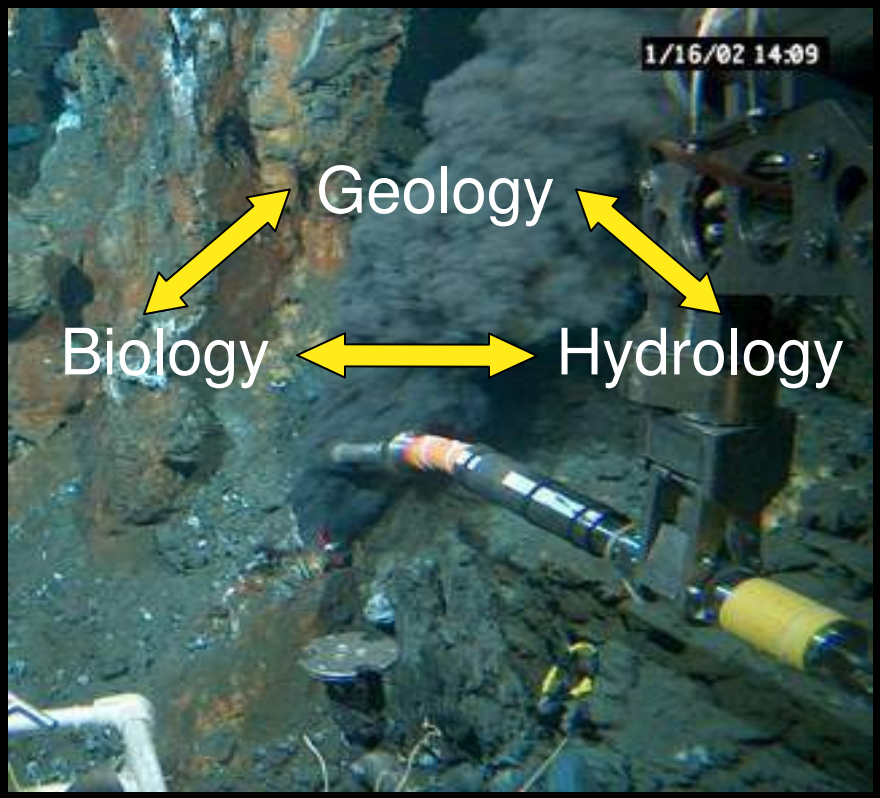


Image courtesy of D. Kelley & J. Delaney, U. Wash.

Penn State CSATS

Integrated Earth System

Mid-ocean ridge spreading centers and cold seeps are excellent examples of integrated earth systems.



Studying Extremes

Deep-ocean study sites are characterized by "extremes":

- Immense pressure
- Extreme temperatures and steep gradients
- Absence of light
- Toxic chemicals (sulfides, heavy metals, hydrocarbons)
- Extreme pH and salinity

Kids (of all ages) love extremes!

Learning by comparison

How can we make this remote, unseen world meaningful to students?

By helping students understand it through comparison with their local environment.

In particular, students collect and analyze data from their local environment and compare these to data from:

- the GLOBE database
- a partner class in another school
- an extreme environment
  (e.g., hydrothermal vent)

Understanding the nature of science

Structured interactions between scientists & other students

- FLEXE Forum - facilitated Q&A between scientists and students
- Peer review of student work by other students
- Field briefings, commentaries and wrap-ups by adult scientists

To help students understand the process and nature of science.

FLEXE - Evaluation Plan

What are student outcomes in learning and attitudes towards science?

- Systematic evaluation of relative efficacy of different approaches using randomized trials
  - "comparative" approach
  - peer review
  - interaction w/ scientists through the FLEXE Forum
- Attention to challenges and opportunities related to language, culture, access to technology, role of teacher, etc.
- Scalability and sustainability through planned turnover

FLEXE Year 1 Focus

Year 1: build the core components & trial

- ✓ Database to track individual student work
- ✓ Peer Review
- ✓ FLEXE Forum : scientist-student interaction

Initial pilot test with 7 schools (~ 15 classes) Mar-May 2007

THANK you so much for your participation!!

- Norfolk ElemS, AR
- Atholton ElemS, MD
- Woodlake Hill MS, TX
- Clyde JHS, TX
- McNair MS, TX
- Phillippi MS, WV
- Penn Cambria MS, PA

FLEXE Year 1 Sample pages

http://flexe.psu.edu/pr/LAsv/svPR.cfm

[GLOBE Collaboration] Login | Peer Review Form

Title

1. Is the title of the report descriptive? Yes No

Introduction

2. Does the report begin with a general statement of the purpose of the research? Yes No

3. Do the authors include a specific prediction in the form of an hypothesis? Yes No

Materials and Method

http://flexe.psu.edu – Student Report

Review this report by filling out the Peer Review Form (it should already be open in a separate window).

[Bring the Peer Review Form to the front]

Title:

The effect of surface type on atmospheric heat

Introduction:

As part of our study of energy in earth syste

Materials & Methods:

We used the protocol provided by the GLOBE FL

Results:

The graph shows the average surface temperatu

Although there is a difference between surfac

Discussion:

Our investigation of temperature variation ov

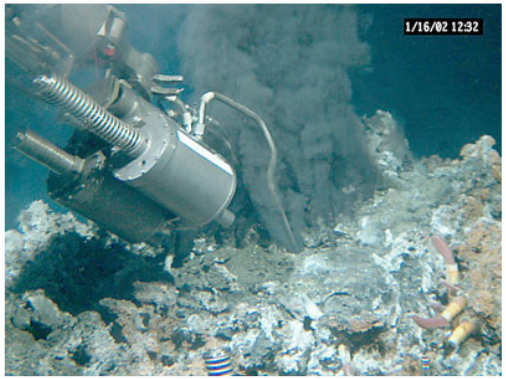
Done

FLEXE : From Local to Extreme Environments

My Home | Reference | Help

FLEXEFORUM

Dataset 2: Chimney Temperature Over Time – Scientist Feedback



Hi FLEXE students. By the looks of your responses this week, you did a great job working with the dataset on the chimney named Bio9. It was challenging to graph these data because the dates for the point measurements were not made at the same time each year (see our graph below). Were you surprised by how hot a vent can get? 386°C (730°F)! We certainly were when we first discovered vents. In fact, we accidentally melted a hole in a milk crate used to hold equipment on the submersible when it got a bit too close to one of these chimneys!I think it is interesting to remember how cold the surrounding seawater is (2°C), and to think about what happens to all that heat from the chimneys. Another thing to keep in mind is that it is *fluid,* not smoke,coming out of the vents. We call it fluid because it is often not clear if it's liquid (think water) or vapor (think steam). Vent fluid boils at 389°C (not at 100°C or 212°F like you are used to for water) because of the pressure it is under and the salt it contains. Remember, there is over a mile of seawater above the vents so the fluid is under a lot of

Featured Scientist:
Karen Von Damm
Chemical Oceanographer
I'm a chemical oceanographer although sometimes I'm called a geochemist.
Read more...

What's going on?

Video of a hydrothermal vent chimney with temperature probe.
Play video...

Measuring temperature at "Bio9" vent in 2002.

Image courtesy of K. Von Damm

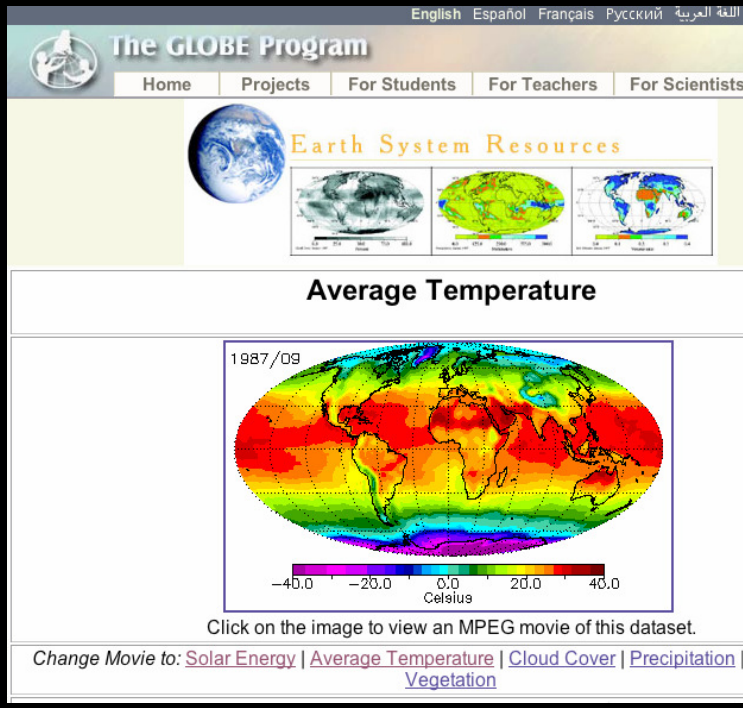
Dive and Discover:
Visit the Dive and Discover website to see the interactive module showing what is under the seafloor crust.

Word Power:
Magma is molten (hot, melted) rock that

FLEXE - Fall 2007 Pilot
Energy Unit

Energy Unit Essential Questions:

- How does energy transfer through components of the earth system - both locally and in the deep-sea?
- What is the source of energy in each environment?
- What is energy vs heat vs temp?
- How is my local environment similar to and different from the extreme environment?



FLEXE - Fall 2007 Pilot

- The pilot will run from September through October with a Wrap-up during a December research cruise
- Students will engage in four learning activities:
  - *Temperature variation around the GLOBE (on-line)*
  - *Temperature variation in our local environment (in-class) with Report writing and Peer Review (on-line)*
  - *Temperature variation in the deep-sea (FLEXE FORUM)*
  - *FLEXE Energy Unit Wrap-up*
- Time commitment: approximately 18 class periods through the fall

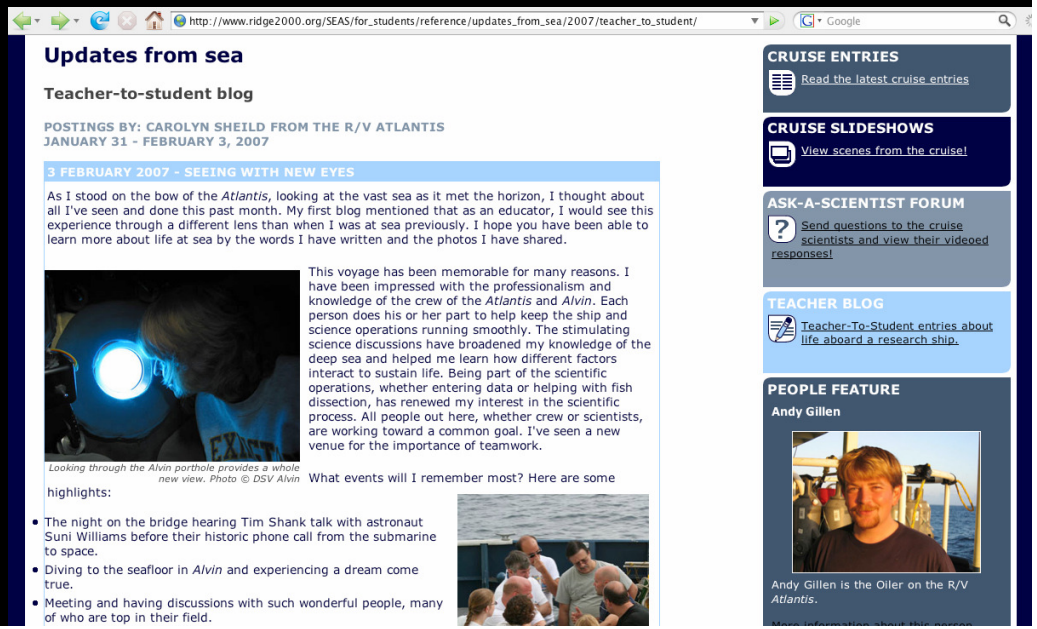
FLEXE Special Event

Deep-sea research cruise website featuring:

- Cruise log, teacher blog
- Questions from pilot students to crew
- “Phone call to the deep” webcast

Check the GLOBE website for details. All are welcome to follow along!

Cruise sails Dec 5th!



Want to learn more?

✓Please attend the Friday workshop for more info and an opportunity to try out the system.

✓Teacher Brief

- Describes activities and time commitment
- Application on last page

See y'all on Friday!